

ART. XXV.—*Descriptions of three unusual forms of Australites from Western Victoria.*

BY PROFESSOR ERNEST W. SKEATS, D.Sc., A.R.C.S., F.G.S.

(With Plate IX.).

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Introduction.

During a visit to the Grampians in February, 1913, in company with Mr. W. H. Ferguson, of the Geological Survey, I paid a visit to the Stony Creek basin, near Hall's gap, from which a considerable quantity of alluvial gold has been obtained. From the gold-bearing gravels and sands a large number of australites has been found from time to time. The gravels are quite shallow, and I understand that some of the australites have been obtained from a depth of a few feet below the surface. I was not successful in my search, but Mr. Charles D'Alton, of Hall's Gap, showed me some which he had found, and generously presented to me for the Geological Museum of the University, two small forms, of remarkable character.

Last week Professor Baldwin Spencer, C.M.G., F.R.S., Director of the National Museum, showed me another remarkable form of australite, from Western Victoria, recently presented to the National Museum by Mr. H. Quiney.

Professor Spencer kindly allowed me to describe this specimen, with the two presented to me by Mr. D'Alton.

*Descriptions of Specimens.*—See Plate.

*Australite, presented by Mr. H. Quiney, to National Museum.*

*Measurements.*—The weight determined by the chemical balance is .5330 grams.

The specific gravity determined by Joly's spring balance is 2.47

Length of australite is 20 mm. or  $\frac{2}{3}\frac{5}{2}$  inch.

Breadth of australite is 10.7 mm. or  $\frac{1}{3}\frac{3}{2}$  inch.

Maximum thickness is 3.5 mm. or  $\frac{9}{64}$  inch.

Length of australite, excluding the flange, is 13 mm. or  $\frac{1}{3}\frac{7}{2}$  inch.

Breadth of australite, excluding the flange, is 8 mm. or  $\frac{5}{16}$  inch.

*Appearance of Australite.*

General characters.—The specimen is shaped somewhat like a pine-seed, being elliptical in outline, flat above, convex below, and tapering at its edge to a thin flange, which is flat at the extremities of the specimen, and curved back on the middle part of the upper surface. The flange has been slightly chipped near each extremity. The colour of the australite ranges from light yellow in the thin flange, through bottle-green to black, but even the thickest part is translucent.

*Flat or upper surface.*

Examined under the microscope with a 2-inch objective, numerous small pits of hemispherical shape are noticed on the middle part of the upper surface. Near the flange these pass into semi-cylindrical grooves, which are recurved at the junction with the flange. The recurving is in opposite directions on opposite sides of the central part of the flange. Near the extremities of the longer axis of the specimen the grooves run out into the flange parallel to the longer axis of the specimen. This recurving of the grooves alluded to above is what would be expected to occur if they were formed while the glass was still plastic and rotating about an axis at right angles to the flat or upper side, while the turning upwards of the central part of the flange might be expected to occur in a plastic body as a result of resistance from the air, while the body was moving in the direction of the assumed axis of rotation.

*Convex or lower surface.*

Pits and grooves are also noticed on this surface of the specimen. In the middle of the specimen they are hemispherical, at the margins of the central part they become semi-elliptical to semi-cylindrical, and in the flange, especially at the extremities of the longer axis, they are drawn out to linear grooves.

*Examination of interior of Australite.*

For this purpose the australite was immersed in water in a watch glass, and examined under the microscope.

The specimen shows no sign of crystals or incipient crystals; it is completely glassy. In polarised light the central parts are completely isotropic, but the marginal parts, especially the thin part of the flange, exhibit grey to white polarization colours, indicating the existence of a state of strain in the glass of the margin and flange of the australite.

*Boat-shaped Australite presented by Mr. Charles D'Alton to  
Geological Museum of the University.*

*Measurements.*—The weight determined by the chemical balance is .4632 grams.

The specific gravity determined by Joly's spring balance is 2.43.

Length of australite is 20 mm. or  $\frac{2}{3}\frac{5}{2}$  inch.

Breadth of australite is 9.5 mm. or  $\frac{3}{8}$  inch.

Maximum thickness is 3 mm. or  $\frac{1}{8}$  inch.

Breadth of australite, excluding the flange, is 4 mm. or  $\frac{5}{32}$  inch.

*Appearance of Australite.*

*General characters.*—The specimen is more or less boat-shaped. It is elliptical in outline, with an upper surface, whose central part is approximately cylindrical, and with a flange curved upwards, imparting a general concave appearance to the upper surface. Much of the flange has been lost by fracture, but in one place appears to be unbroken, and there the outer rim of the flange is slightly curved back, and appears to be fluted. The specimen is bottle-green to black in colour.

*Concave or upper surface.*

The central convex or cylindrical portion has a slight constriction or "waist" developed half-way between the extremities. The latter taper off towards a point. The surface of the central portion shows small hemispherical pits, but most prominently developed, especially near the junction with the flange are long, semi-cylindrical grooves, running generally parallel to the longer axis of the australite, and curving in at the "waist," and outwards beyond it. A few short grooves run nearly at right angles to these across the central convex portion. The flange does not show a constriction to a "waist," and exhibits on its surface small hemispherical pits.

*Convex or lower surface.*

This shows a few longitudinal grooves near the flange, but the general surface is covered with a large number of pits, some small and hemispherical, others large and flatter, as if adjacent pits had become confluent.

*Examination of interior of Australite.*

The australite was immersed in water in a watch glass, and examined under the microscope.

The specimen is completely glassy, showing neither crystallites or microlites, and is completely isotropic, except for slight strain polarization effects at the thin ends of the australite.

*Disc-shaped Australite presented by Mr. Charles D'Alton to Geological Museum of the University.*

*Measurements.*—The weight determined by the chemical balance is .3184 grams.

The specific gravity determined by Joly's spring balance is 2.41. Length of australite is 13 mm. or  $\frac{1}{2}$  inch.

Breadth of australite is 11.8 mm. or  $\frac{1.5}{3.2}$  inch.

Maximum thickness is 1.2 mm. or  $\frac{3}{6.4}$  inch.

Length of australite, excluding the flange, is 5.2 mm. or  $\frac{1.3}{6.4}$  inch.

Breadth of australite, excluding the flange, is 4.5 mm. or  $\frac{3}{16}$  inch.

*Appearance of Australite.*

The specimen is approximately disc-shaped, and almost circular in outline. It is dark bottle-green in colour, and quite translucent, owing to its thinness. The flange is much broader, and slighter thicker than the central portion. The edge of the flange is perfect, except for a small chip. It is smooth, except for small pits and quite clearly could never have formed a portion detached from a glass bubble.

*Upper Surface.*—The whole surface is crowded with minute pits, some hemispherical in shape, some shallower, and many are confluent at their edges. In addition shallow grooves are seen forming a closed, roughly elliptical curve tangent at one point to the central portion, and passing out to near the margin of one part of the flange. The junction of the flange with the central portion is depressed, and the flange as a whole is thicker than the central portion.

*Lower Surface.*—The lower surface is almost flat. It is covered with minute pits, and in the central portion with sub-parallel grooves trending in the direction of the longer axis of the specimen. These grooves, however, fail to reach the margin of the flange.

*Examination of interior of Australite.*

The australite was immersed in water in a watch glass, and examined under the microscope.

On focusing beneath the surface of the australite, it was noticed that the pits or bubbles were internal, as well as external, and were in places arranged roughly in rings. A few still smaller gas bubbles, with dark borders, were also noticed. The specimen was entirely glassy and isotropic, except for slight evidence of strain polarization.

*Conclusion.*

The three australites above described are remarkable, and I think constitute more or less distinct types from any hitherto described. The best and most complete reproduction of different types of australites is given by Mr. E. J. Dunn,<sup>1</sup> and includes button shaped, ellipsoidal, dumb-bell shaped, and almost spherical forms.

To these must now be added the "pine-seed" type, the "boat-shaped" type, and the discoidal type.

The three specimens described are remarkable also for their small dimensions and light weight. I believe the disc-shaped specimen from the Stony Creek Basin in the Grampians is the smallest and lightest australite hitherto described.

## DESCRIPTION OF PLATE.

- A is the pine-seed type of australite. (Nat. Museum collection).  
B is the disc-shaped type of australite. (Geol. Dept. Univ. collection).  
C is the boat-shaped type of australite. (Geol. Dept. Univ. collection).  
Below each australite is a drawing of a transverse section through the australite, and a drawing of the upper surface, showing the flange and peculiar distribution of grooves. Millimetre and inch scales are shown.

<sup>1</sup> Records of Geol. Survey of Victoria, vol. ii., pt. 4, 1908, pp. 202-207.  
Bulletin of Geol. Survey of Victoria, No. 27, 1912.